
स्लाइडिंग वेन रोटरी वायु संपीड़कों के लिए
तकनीकी आपूर्ति की अवस्थाएँ
(पहला पुनरीक्षण)

Technical Supply Conditions for
Sliding Vane Rotary Air
Compressors
(First Revision)

ICS 23.140

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FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Compressor, Blowers and Exhausters Sectional Committee had been approved by the Mechanical Engineering Division Council.

This Indian Standard was first published in 1984. The first revision has been taken up for incorporating the modifications found necessary as a result of experience gained with the use of this standard. Also, in this revision, the standard has been brought into the latest style and format of Indian Standards, and references wherever applicable have been updated. BIS certification marking clause has also been modified to align with the revised *Bureau of Indian Standards Act*, 2016. The major modifications incorporated in this revision are as follow:

- a) Clauses **3, 5.1, 5.3.1, 5.3.2, 7.2, 7.5.1, 7.6.1, 7.7.1** and **9** have been modified;
- b) A new clause **7.7.3** has been added covering the other types of belts; and
- c) Amendment No. 1 has been incorporated.

The composition of the Committee responsible for the formulation of this standard is given in Annex D.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Indian Standard***TECHNICAL SUPPLY CONDITIONS FOR SLIDING VANE
ROTARY AIR COMPRESSORS***(First Revision)***1 SCOPE**

This standard covers the technical supply conditions for sliding vane type rotary air compressors for general purpose, having not more than 20 bar discharge pressure and capacity not more than 5 000 m³/h.

2 REFERENCES

The standards listed in Annex A contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of these standards.

3 TERMINOLOGY

For the purpose of this standard, the terms and definitions as laid down in IS/ISO 3857-1 and IS/ISO 3857-2 shall apply.

4 TYPES

The sliding vane rotary compressors are generally of the following types:

- a) Sliding vane rotary compressor, water-cooled type; and
- b) Sliding vane rotary compressor, oil-flooded type:
 - 1) Water cooled; and
 - 2) Air-cooled.

5 ENQUIRY AND PROPOSAL**5.1 Enquiry**

5.1.1 The purchaser shall complete the data as given in Annex B to the extent possible and applicable and also specify any known abnormal conditions of working. In addition, the purchaser may also specify any of the additional requirements.

5.1.2 A reference to IS 6206 will help the purchaser in framing the specification of the compressor and its auxiliaries.

5.1.3 In case of conflict between this standard and the enquiry or order, the agreement reached between

the purchaser and the supplier shall form a part of the order and that shall govern the supply.

5.2 Proposals

5.2.1 The supplier shall include a data sheet in the proposal according to Annex C. Any other details required by the purchaser shall also be included.

5.2.2 The proposal shall include either a specific statement that all equipment are in strict compliance with the purchaser's specification or a specific list of deviation therefrom shall be furnished.

5.2.3 The supplier shall also submit a list of spare parts for two years of normal operation for the maintenance of the machine.

5.2.4 The conditions for erection and commissioning of the compressors shall be as agreed to between the supplier and the purchaser.

5.3 Guarantee**5.3.1 Performance Guarantee**

The compressor shall be guaranteed for satisfactory performance at the specified operating conditions. These include a guarantee for flow rate and power at the time of performance unless guarantees on other items have been specifically asked by the purchaser. The tolerances to be allowed on the flow rate and power consumption shall be according to IS 5456. Free air delivery (FAD) measurement and acceptable flow and specific power tolerances shall be as per IS/ISO 1217 as per Annex B or Annex C or Annex E basis fixed speed or variable speed compressor.

5.3.2 Workmanship Guarantee

All equipment components and spare parts other than bought-out items shall be guaranteed by the supplier against defects which despite proper use appear therein and arise from defective or improper materials or poor or faulty workmanship. This guarantee shall be applicable for a period of 12 months from the date of supply or 2 000 working hours whichever is earlier. The guarantee period from the date of supply may be the same as above or more basis the mutual agreement between supplier and purchaser, whichever is earlier. If any defect or

malperformance is established during the guarantee period, the supplier shall make all necessary and desirable alterations, repairs, and replacements free of charge.

NOTE — A list of bought-out items shall be furnished to the user. The original manufacturer guarantee shall be passed to the user.

6 REQUIREMENTS OF MAJOR ASSEMBLIES/SUB-ASSEMBLIES

6.1 Compressor

6.1.1 Compressor, prime mover and auxiliary equipment shall be designed for the required duty at the specified operating conditions, and for rapid and easy maintenance.

6.1.2 Where special area classification for electricals and instruments is specified, these shall be followed for the design and construction of these items to meet the relevant safety requirements.

6.2 Rotor Chamber

6.2.1 Surfaces shall be cleaned by sand blasting/shot blasting/pickling, etc. In case grey iron and steel castings are used, they shall conform to IS 210 and IS 1030 respectively.

6.2.2 Maximum allowable working pressure shall be at least 110 percent of the rated discharge pressure.

6.2.3 In the case of water jacketing the rotor chamber shall have a water jacket whose design pressure shall not be less than 0.4 MPa (1 MPa = 10 kgf/cm² approximately).

6.2.4 If the design is such that the compressor sleeve is used in the rotor chamber then, the suction and discharge port angles shall be specified by the supplier. This will help the end user to get the sleeve of correct angles inserted during subsequent maintenance if required.

6.3 Rotor

6.3.1 The axial clearance and bottom clearance shall be specified by the supplier for the assembly of the rotor.

6.3.2 Type of bearings, their lubrication and the type of fit on the rotor shall also be furnished by the supplier.

6.3.3 The rotor slots shall offer free gliding movement to vanes during operation.

6.4 Cooling System

The compressor shall be provided with an efficient cooling system.

7 PRIME MOVER AND DRIVE EQUIPMENT

7.1 In case the prime mover is required to be supplied along with the compressor, the purchaser shall specify in the enquiry, the technical data required for the prime mover design (type of motor, electrical supply characteristics, type of engine, etc) and also the standard to which the prime mover shall conform.

7.2 The rated power of the prime mover shall be higher by at least 10 percent from the maximum power (maximum power includes shaft power or brake power plus all transmission losses) required under rated discharge pressure and standard air inlet conditions as defined in IS/ISO 3857-1 and IS/ISO 3857-2.

7.3 The prime mover shall have sufficient starting torque so as to be capable of starting the compressor from a no-load condition and running it up to full speed.

7.4 When the prime mover is to be procured by the purchaser the supplier shall furnish the following data:

- a) Compressor and transmission starting torque characteristics;
- b) Inertia value (GD²); and
- c) Mounting or coupling details or both.

7.5 Coupling

Various types of coupling, such as friction disc coupling type and internal gear type may be used.

7.5.1 If the coupling used is of cast iron of flexible type, the same shall conform to IS 2693.

7.5.2 The coupling shall be so designed that they are dismantled without disturbing the internal components of compressors and prime mover.

7.5.3 Coupling shall be suitable for expansion and any other movement of the shaft.

7.6 Reduction Gears

7.6.1 Gears shall be of suitable design and made generally conforming to IS 3681.

7.7 Belts

7.7.1 In the case of belt drives, the V-belts shall be according to IS 2494 (Part 1) and IS 14261.

7.7.2 If more than one V-belt is required, a matched set shall be supplied.

7.7.3 Other types of belts like timing type belts, which can result in better power transmission can be used with mutual agreement.

8 AUXILIARY EQUIPMENT

8.1 Guards

8.1.1 Removable guards shall be provided on all movable parts which are likely to be hazardous to operating personnel.

8.1.2 If guards are not removable, for example, fly-wheel guards, access openings (if necessary with covers) shall be provided for access to any part requiring attention or for rotary parts manually.

8.2 Filter

8.2.1 Purchaser shall specify if there is any particular atmospheric pollution adjacent to the compressor so as to enable the manufacturer to select a proper filter.

8.2.2 The position of the filter shall be such as to permit easy cleaning. Filter shall be placed as close to the compressor as possible.

8.2.3 The purchaser may specify any special requirement regarding filtering particle size in microns and required efficiency, otherwise manufacturer may furnish his standard filter and state the normal cleaning interval replacement.

8.2.4 For non-lubricated compressors, dry filters shall be furnished.

8.3 Compressed Air Cooler

The cooler may be of either water-cooled type or air-cooled type. In case the cooler is of water-cooled type, it shall conform to the following requirements.

8.3.1 Intercoolers and after coolers shall be designed on the air side to the design pressure not less than the safety valve set pressure. The design pressure for the water side shall be 3.5 bar minimum or as specified by the purchaser.

8.3.2 The fouling factor to be used on the water side shall be as agreed to between the purchaser and the supplier.

8.3.3 In case shell and tube type of cooler is engaged, the design and construction shall be according to IS 4503. The cooled air shall be brought to within 10 °C of the cooling water supply temperature.

8.4 Separators, Traps and Air Receivers

8.4.1 Proper arrangements shall be made to remove oil and condensate after each air cooler.

8.4.2 If separate separators are provided for the purpose, they shall be of standard quality. The air receiver, if provided, after the final discharge shall be manufactured according to IS 7938.

8.4.3 Where automatic drain traps are used, these shall be provided with isolating valves to allow trap maintenance with the compressor running.

8.5 Piping

8.5.1 The pipe work required with the compressor consists of:

- a) Air piping — Inlet and final discharge piping; and
- b) Auxiliary pipe work — Lubricating oil, cooling water drain and vent, and instrument air piping.

8.5.2 The scope of supply of pipe work by the supplier shall be properly defined with terminal points clearly fixed. The supplier shall supply all pipe work to interconnected items of his supply reducing the number of terminal points for the purchaser connection to a minimum. Auxiliary pipe work, for example, required for lubricating oil, cooling water drain and vent and instrument air shall be machine mounted in fully erected and fabricated condition unless otherwise agreed. The fashion in which the air piping, for example, for inlet and final discharge is to be supplied shall be stated by the purchaser.

8.5.3 The water pipe work shall be fitted with a high point vent and low pipe drain connection such that the entire system can be vented and drained.

9 CONTROLS AND INSTRUMENTATION

9.1 Instruments

The following instruments shall be included in the supply which are considered as normal requirement. Extra instruments as specified by the purchaser shall also be included.

9.2 Pressure and temperature gauges or sensors or transmitters, flow and level indications.

- a) Air side — Outlet pressure gauge or sensor or transmitter - each stage.
Outlet temperature gauge or sensor or transmitter - final stage.
- b) Oil side — Oil level indicator - Oil pressure gauge or sensor or transmitter.
- c) Cooling water side — Cylinder jacket flow indicator for each parallel circuit if applicable.
Temperature gauge or sensor or transmitter at cooling water outlet (optional).
Flowmeter for cooling water (optional).

9.3 Safety Devices

A suitable safety device shall be provided to safeguard against high discharge air temperature.

9.4 Safety Valves

The final stage only shall be protected by a safety valve. The valve shall be sized for full capacity of the compressor with a set pressure not more than 10 percent of the maximum operating pressure of the stage. The safety valve shall be mounted in such a manner that the setting is not disturbed by the vibration.

10 DOCUMENTS

Each compressor shall be supplied with the following documents:

- a) User's handbook for compressor and prime mover, if supplied;
- b) Maintenance manual;
- c) Guarantee certificate; and
- d) Part identification list.

11 TESTS

11.1 The test other than hydrostatic and pressure tests, shall be in accordance with IS 5456 or Annex B or Annex C or Annex E of IS/ISO 1217.

11.2 Hydrostatic and Pressure Test

All pressure-containing parts including cooling jackets shall be subjected to hydrostatic test pressure

equal to 1.5 times the maximum allowable working pressure. However, this test pressure shall not be lower than 0.7 MPa. The piping, pressure vessels, filters, coolers, and the line shall be subjected to a hydrostatic test pressure of 1.5 times the design pressure or in accordance with the specified code.

12 MARKING

12.1 The following data shall be clearly stamped or engraved on the frame nameplate:

- a) Vendor's name;
- b) Serial number;
- c) Frame size and model;
- d) Rated speed;
- e) Rated capacity;
- f) Rated pressure; and
- g) Month and year of manufacture.

12.2 BIS Certification Marking

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act, 2016* and the Rules and Regulations framed thereunder, and the products may be marked with the Standard Mark.

12.3 Rotation

Arrows showing the direction of rotation shall be cast in or attached to each rotating equipment.

ANNEX A

(Clause 2)

LIST OF REFERRED STANDARDS

<i>IS No.</i>	<i>Title</i>	<i>IS No.</i>	<i>Title</i>
IS 210 : 2009	Grey iron castings — Specification (<i>fifth revision</i>)	IS 6206 : 1985	Guide for selection, installation and maintenance of air compressor plants with operating pressures up to 10 bars (<i>first revision</i>)
IS 1030 : 1998	Carbon steel castings for general engineering purposes — Specification (<i>fifth revision</i>)	IS 7938 : 2023	Air receivers for compressed air installation — Specification (<i>first revision</i>)
IS 2494 (Part 1) : 1994	V-belts — Endless V-belts for industrial purposes: Part 1 General purpose — Specification (<i>second revision</i>)	IS 14261 : 1995	Transmission devices — V-belts endless narrow v-belts for industrial use — Specification
IS 2693 : 1989	Power transmission — Bush type flexible coupling (<i>second revision</i>)	IS/ISO 3857-1 : 1977	Compressors, pneumatic tools and machines — Vocabulary: Part 1 General
IS 3681 : 1995	Gears — Cylindrical gears — Accuracies (<i>first revision</i>)	IS/ISO 3857-2 : 1977	Compressors, pneumatic tools and machines — Vocabulary: Part 2 Compressors
IS 4503 : 1967	Specification for shell and tube type heat exchangers	IS/ISO 1217 : 2009	Displacement compressors — Acceptance test
IS 5456 : 2006	Testing of positive displacement type air compressors and exhausters — Code of practice (<i>second revision</i>)		

ANNEX B

(Clause 5.1.1)

DATA SHEET CONTAINING PURCHASER'S REQUIREMENTS**B-1 GENERAL**

- a) Installed compressed air capacity required (FAD in m³/h);
- b) Capacity range of each unit;
- c) Number of running units;
- d) Number of standby units;
- e) Operation — Continuous/Intermittent;
- f) Type of prime mover — Electric motor/engine turbine;
- g) Whether drive to be furnished by the supplier or to be arranged by purchaser;
- h) Discharge pressure in the bar;
- j) Discharge temperature limitation, if any;
- k) Type of cooling whether air-cooled or water-cooled;
- m) Space limitation, if any; and
- n) Insulation details-indoor/outdoor.

B-2 PRIME MOVER DETAILS

B-2.1 In the case of electric motor, whether the following are required or not:

- a) Squirrel cage (SPDP/TEFC);
- b) Slip ring (SPDP/TEFC);
- c) Type of protection;
- d) Insulation choice, if any;
- e) Whether the equipment has to withstand any tropical conditions/hazardous area, and if so;
- f) Class/Grade/Division;
- g) Supply voltage at purchaser's end, voltage variation, if any;
- h) Details of switch gear in case to be included by the supplier;
- j) Supply frequency; and
- k) Any other details.

B-2.2 In case the prime mover is an engine:

- a) Fuel used;
- b) Type of cooling — air-cooled/water-cooled;
- c) Operating conditions including site details as mentioned in **B-3**; and
- d) Any other detail.

B-2.3 In case the prime mover is a turbine:

- a) Steam temperature and pressure;
- b) Operating conditions including site details as mentioned in **B-3**; and
- c) Any other details.

B-3 OPERATING CONDITIONS

- a) Site details, including barometric pressure

- b) Ambient temperature variation maximum.....minimum;
- c) Relative humidity.....maximumminimum; and
- d) Cooling water availability and temperature.....maximum..... minimum.

B-4 TYPE OF CONTROL

- a) For the battery of compressors, whether manual, semi-automatic or fully automatic; and
- b) Details of control panel and scope of supply.

B-5 DRIVING DETAILS

- a) Direct coupled through semi-elastic coupling,
- b) V-belt driven; or
- c) Flat belt driven; or
- d) Reduction gear driven; or
- e) Any other type of coupling.

B-6 SCOPE OF SUPPLY

- a) Prime mover;
- b) Additional instrumentation;
- c) Safety devices;
- d) Intercooler;
- e) Aftercooler;
- f) Filter, including type and standard;
- g) Silencer;
- h) Cooling water pipe and manifold;
- j) Instrument panel;
- k) Spare parts;
- m) Set of tool;
- n) Other accessories, if any;
- p) Interstage air and water piping; and
- q) Air receiver, if required, and its capacity.

B-7 INSPECTION PROCEDURE AND DETAILS OF TESTS (As per IS 11461)

- a) Component inspection; or
- b) Interstage inspection; or
- c) Assembly inspection; or
- d) Running performance test;
- e) Hydraulic test of cylinders/cylinder jackets; and
- f) Hydraulic test for coolers.

B-8 ACCEPTABLE NOISE LEVEL AT PURCHASER'S END

ANNEX C

(Clause 5.2.1)

DATA SHEET TO BE ENCLOSED BY THE SUPPLIER ALONG WITH THE PROPOSAL**C-1 TYPE OF COMPRESSORS OFFERED**

- a) Rotary vane:
 - 1) Water-cooled; and
 - 2) Oil flooded:
 - i) Water-cooled
 - ii) Air-cooled
- b) Number of compression stages.

C-2 CAPACITYFAD at the rated discharge pressure in m³/h.**C-3 PRESSURE**

- a) Maximum allowable working pressure; and
- b) Rated discharge pressure in bar.

C-4 SPEED**C-5 PRIME MOVER AND DRIVE DETAILS**

- a) Type of prime mover included in offer;
- b) Type of power transmission arrangement;

- c) Shaft power consumption of the compressor at rated speed and rated discharge pressure;
- d) Rated power of prime mover at the operating conditions, after deration;
- e) Prime mover details including the pre-requisite to be arranged for the same by the purchaser; and
- f) Details of switch gear/starting device if included in the estimate.

C-6 OIL PUMP DETAILS

- a) Capacity of pump;
- b) Viscosity of oil and its flash point; and
- c) Oil charge operating period.

C-7 COMPRESSOR DETAILS

- a) Material of valve.

C-8 APPROXIMATE SPACE REQUIREMENT FOR THE INSTALLATION**C-9 DETAILS OF ACCESSORIES INCLUDED WITH EACH UNIT**

ANNEX D*(Foreword)***COMMITTEE COMPOSITION**

Compressor, Blowers and Exhausters Sectional Committee, MED 22

<i>Organization</i>	<i>Representative(s)</i>
Bharat Petroleum Corporation Limited, Mumbai	SHRI K. RAVI (<i>Chairperson</i>)
Atlas Copco India Limited, Pune	SHRI VIJAY SHARMA
Automotive Research Association of India, Pune	SHRI PRASAD YADAV SHRI ATUL GAIKWAD (<i>Alternate</i>)
Bharat Heavy Electrical Limited, New Delhi	SHRI S. DURAIRAJ SHRI Y. V. RAMA LAKSHMI (<i>Alternate</i>)
Bharat Petroleum Corporation Limited, Mumbai	SHRI KANNAN V. V.
Boldrocchi Indian Private Limited, Gurugram	SHRI NOKESH AGGARWAL SHRI PIYUSH GOEL (<i>Alternate</i>)
Burckhardt Compression India Private Limited, Noida	SHRI R. S. GUNAJI SHRI A. BHASKAR PRABHUNE (<i>Alternate</i>)
CSIR - National Aerospace Laboratories, Bengaluru	SHRI THENNAVARAJAN S
CSIR - National Physical Laboratory, New Delhi	DR RAJESH KUMAR PROF (DR) M. SINGH (<i>Alternate</i>)
Directorate General of Quality Assurance, Ministry of Defense, New Delhi	LT COL DEEPAK SHARMA SHRI U. R. RAJA (<i>Alternate</i>)
Dresser-Rand India Private Limited, Pune	SHRI M. H. VYAS SHRI J. B. RAVAL (<i>Alternate</i>)
ELGI Equipments Limited, Coimbatore	SHRI JAYARAJ B. SHRI S. SENTHIL KUMAR (<i>Alternate</i>)
Engineers India Limited, Gurugram	SHRI J. S. DUGGAL SHRI MAHESH EASWARAN (<i>Alternate</i>)
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Hindustan Petroleum Corporation Limited, Mumbai	SHRI M. RAMBABU SHRI V. V. RAJSEKHAR (<i>Alternate</i>)
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Indian Register of Shipping, Mumbai	SHRI SUNEET DIGIKAR SHRI KARTHIK S. (<i>Alternate</i>)
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Kirloskar Pneumatic Company Limited, Pune	SHRI PRAMOD KUMAR YADAV SHRI AMIT SAXENA (<i>Alternate</i>)

<i>Organization</i>	<i>Representative(s)</i>
MECON Limited, Ranchi	SHRI SUJOY BANERJEE SHRI A. K. MODI (<i>Alternate</i>)
National Fertilizers Limited, Noida	SHRI M. N. GOYAL SHRI RAJEEV KUMAR AGARWAL (<i>Alternate</i>)
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NTPC Limited, New Delhi	SHRI ANUJ KUMAR SHAHI SHRI DOONDESHWAR V. (<i>Alternate</i>)
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Project and Development India Limited, Noida	SHRI S. MANDILWAR SHRI AJAY K. S. RUHEL (<i>Alternate</i>)
Reliance India Limited, Mumbai	SHRI S. K. GARYALI SHRI RANJIT S. MUNDRA (<i>Alternate</i>)
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Member Secretary
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(MECHANICAL ENGINEERING), BIS

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website- www.bis.gov.in or www.standardsbis.in.

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